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Bathonian brachiopods of the Mecsek Mts (Hungary)

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(11 figures and 2 plates on pp. 237–238)

Abstract

New collections from the red nodular Bathonian limestones of the Mecsek Mts have resulted in more than 400 brachiopod specimens. Systematic description of eight species is given; from among them *Dichotomosella galaczi* sp. n. and *Karadagithyris eduardi* sp. n. are new. A short revision of the museum's material kept in the Hungarian Geological Survey is added.

Key words: brachiopods, systematic descriptions, Bathonian, Mecsek Mts

Introduction

In the Mecsek Mts the Bathonian stage is represented by an around ten metres thick reddish, clayey nodular limestone sequence (Óbánya Limestone Formation). This facies, a variety of an "Ammonitico Rosso marl" is not favourable for the benthos which is, in fact, very subordinate in relation to the abundant ammonoids. Within the benthonic assemblage, however, brachiopods are predominant over the bivalves and sponges.

BÖCKH (1881) was the first to mention and describe brachiopods from the Bathonian beds; two species were figured also in his monograph devoted to the ammonoid fauna. After a long silence, VADÁSZ (1935) enlarged a little the knowledge of the Bathonian brachiopods of the Mecsek, repeating some of BÖCKH's determinations and listing a few other species. His faunal lists were not accompanied by detailed descriptions, but the original material was kept in the collection of the Hungarian Geological Survey (HGS) and was revised by the present author.

In the last decades the knowledge of the Bathonian faunas of the Mecsek was mainly contributed by the "explanatory notes" to the geological maps of the area published by the HGS. Unfortunately, no improvements can be found in them in relation to the brachiopods; they repeated the faunal lists of VADÁSZ (1935). (The only exception is a short list of brachiopod determinations by L. KOVÁCS (1953), including some strange species names. This material was not found in the collections of the HGS.)

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The last contribution was given by TÖRÖK et al. (1987) who figured two specimens under the name *Cererithyris* sp., aff. *intermedia* (SOWERBY, 1812). In fact, this determination was made by the present author and it was a definitely wrong judgement, based on the apparent external similarity, but without the knowledge of the internal morphology. In the light of the new information presented herein, these specimens belong to the species *Karadagella zorae* TCHORZHEVSKY & RADULOVIĆ, 1984.

In 1990 a new project has started in order to gather accurate stratigraphical information from the Bathonian sections of the Mecsek Mts. The project has been supported by the National Scientific Research Fund and led by Dr. András GALÁCZ. During several summer campaigns, a great amount of fossils has been collected; the copious new material made a modern study of brachiopods possible. The detailed systematical description of the collected brachiopod fauna takes the main part of the present paper, but first a short taxonomical and nomenclatorial revision of the old material found in the collections of the Hungarian Geological Survey is given.

Revision of the Bathonian brachiopods of the Mecsek Mts kept in the collections of the HGS

The material was collected mainly by K. HOFMANN, J. BÖCKH (in the 1870s) and E. VADÁSZ (in the 1930s) from various localities of the Mecsek Mts, and amounts to a few dozens of specimens. Partly different species determinations were given by BÖCKH (1881) and VADÁSZ (1935). The two revised faunal lists will be given separately below.

BÖCKH (1881)

Rhynchonella cf. *spathica* LAM. sp. = ? = *Stolmorhynchia* sp., aff. *stolidota* BUCKMAN
Rhynchonella penninica UHLIG = *Apringia* ? *penninica* (UHLIG)
Terebratula cf. *perovalis* SOW. = ? = *Karadagella zorae* TCHORZHHEVSKY & RADULOVIĆ (the original specimens were not found.)
Waldheimia (Zeilleria) digona SOW. sp. = Terebratulida indet.

VADÁSZ (1935)

Rhynchonella cf. *voultensis* OPP. = *Caucasella voultensis* (OPPEL)
Rhynchonella spathica LAM. ? = *Stolmorhynchia* sp., aff. *stolidota* BUCKMAN
Rhynchonella penninica = *Apringia* ? *penninica* (UHLIG)
Acanthothyris sp. = *Capillirhynchia* cf. *brentoniaca* (OPPEL)
Terebratula dorsoplicata SUESS = *Karadagella zorae* TCHORZHEVSKY & RADULOVIĆ
Terebratula cf. *excavata* DESL. = *Linguithyris* cf. *nepos* (CANAVARI)
Zeilleria digona SOW. = Terebratulida indet.

In summary, the revised list of the old material is the following:

Caucasella voultensis (OPPEL)

? *Stolmorhynchia* sp., aff. *stolidota* BUCKMAN
Apringia ? *penninica* (UHLIG)
Capillirhynchia cf. *brentoniaca* (OPPEL)
Linguithyris cf. *nepos* (CANAVARI)
Karadagella zorae TCHORSZHEVSKY & RADULOVIĆ

One of these, *Apringia* ? *penninica* did not appear in the new collections which, on the other hand, contained further three species, previously unknown from the Bathonian of the Mecsek.

Bathonian brachiopods of the Mecsek: the new collections

The brachiopods, together with other fossils have been collected mainly by A. GALÁCZ, I. SZENTE, L SÖVÉR, T. BERTALAN, a few university students and the present author. The collected material amounts to 415 specimens with a strong predominance of *Karadagella zorae* (357 specimens). The most important localities are shown in Fig. 1. The distribution of the brachiopods according to localities is given below.

Locality	specimens
Hidas valley	324
Sövér ravine	42
Óbányai valley	7
Márévár valley (including Somosi Creek)	13
Síngödör	4
Csengő Hill	1
Ófalu	2
Zengővárkony	1
Mecsek (locality not specified)	21
Total	415

The fauna consists of the following species:

Caucasella voultensis (OPPEL, 1865)
Stolmorhynchia sp., aff. *stolidota* BUCKMAN, 1918
Dichotomosella galaczi sp. n.
Capillirhynchia brentoniaca (OPPEL, 1863)
Linguithyris nepos (CANAVARI, 1882)
Karadagella zorae TCHORSZHEVSKY & RADULOVIĆ, 1984
Karadagithyris eduardi sp. n.
Zittelina ? *beneckei* (PARONA, 1880)

The stratigraphical distribution of the brachiopods in the systematically collected sections is not really conclusive. They seem to reach the greatest density and diversity in the Upper Bathonian. Most species run through the Bathonian, some of them

(*Capillirhynchia brentoniaca*, *Zittelina* ? *beneckei*) seem to be restricted to the Upper Bathonian but this may be due to imperfect record as well.

The fauna shows a surprisingly strong Mediterranean affinity; only two species occurred in the NW-European province. The close similarity to the fauna of the Pieniny Klippen Belt of the Carpathians is very remarkable; almost all species (or their closely related forms) were found also there.

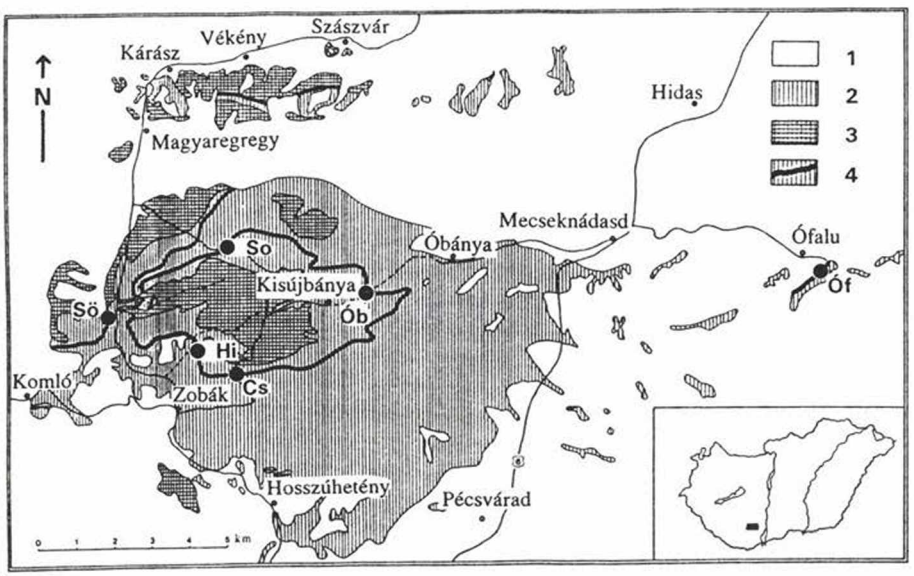


Fig. 1. Simplified geological map of the eastern Mecsek showing the most important Bathonian localities. **1.** Cretaceous and Tertiary. 2. Lower and Middle Jurassic. **4.** Upper Jurassic. **4.** Bathonian, red, calcareous marl. **So.** Somosi Creek. **Ób.** Óbánya valley. **Sö.** Sövér ravine. **Hi.** Hidas valley. **Cs.** Csengő Hill. **Óf.** Ófalu.

In the following descriptions the systematics of the "Treatise" (MOORE, 1965) is used except the subsequently created genera *Karadagella* and *Karadagithyris*, where the higher systematics of TCHORSZHEVSKY & RADULOVIĆ (1984) is applied.

The material is deposited in the Department of Geology and Palaeontology of the Hungarian Natural History Museum (HNHM) (Budapest). The figured specimens are under the inventory numbers M. 94.88. to M. 94.115.

Systematic descriptions

Order Rhynchonellida KUHN, 1949
Superfamily Rhynchonellacea GRAY, 1848
Family Dimerellidae BUCKMAN, 1918
Genus *Caucasella* MOISSEEV, 1934

Caucasella voultensis (OPPEL, 1865)
(Plate I: 1a–d, 2a–d, Fig. 2)

1859 *Rhynchonella trigona* (QUENST.) – DESLONGCHAMPS, La Voulte, p. 202, pl. 2, figs. 8, 8a.
1865 *Rhynchonella Voultensis* OPP. – OPPEL, Ardèche, p. 317 (footnote).
1886 *Rhynchonella Voultensis* OPPEL – ROTHPLETZ, Vilser Alpen, p. 153, pl. 11, figs 18, 25.
1916 *Rhynchonella voultensis* OPP. – JEKELIUS, Brassói hegyek, p. 245, pl. 4, figs. 1, 1a.
1925 *Rhynchonella voultensis* OPP. – JEKELIUS, Berge von Brassó, p. 50, pl. 1, figs. 1, 1a
v 1935 *Rhynchonella* cf. *voultensis* OPP. – VADÁSZ, Mecsekhegység, p. 59.

Material: 4, partly incomplete specimens.

Dimensions (mm):	L	W	T
M. 94.88.	9.8	10.8	6.8
M. 94.89.	13.6	12.5	8.4
M. 94.90.	11.0	12.5	7.1

Description:

External characters: Medium-sized *Caucasella* with subtrigonal outline. The lateral margins are divergent with an apical angle slightly below 90° and passes to the straight anterior margin through subrounded anterolateral extremities. The valves are equally convex, the maximum convexity lies in the posterior one-third. The beak is erect. The pedicle opening is rather large; the delthyrium cannot be seen. The beak ridges are poorly developed and short, reaching the half of the lateral margins. The planareas are shallow and poorly demarcated. The lateral commissures are nearly straight. The anterior commissure is rectimarginate, and shows sharp and uniform zig-zag deflections; their amplitude equals to their "wave-length". The surface of the shell is ornamented with radial ribs. Posteriorly they are ill-defined and low but become sharp and strong close to the anterior margin; their number varies between 8 and 11.

Internal characters (Fig. 2): *Pedicle valve*: The delthyrial cavity is subquadrate to semicircular in cross-section; the umbonal cavities are poorly preserved. The dental plates are slightly convergent ventrally. Pedicle collar has not been observed. The hinge teeth are rather massive with crenulated posterior end. *Brachial valve*: Cardinal process is not seen. The dorsally divergent crural plates are thin and short; they support septifer crura. The outer hinge plates are subhorizontal and connected to the ventral end of the crura.

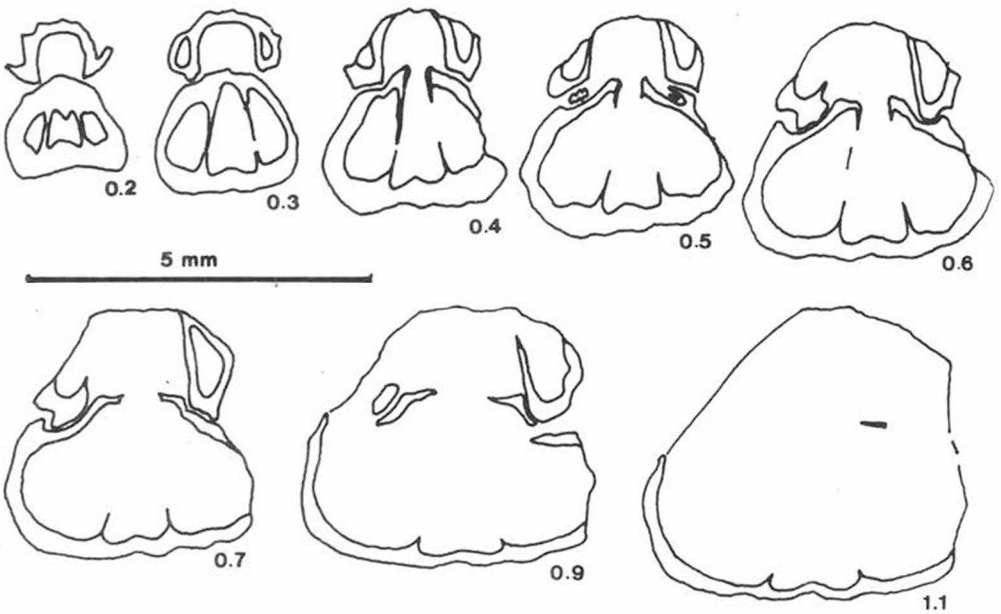


Fig. 2. *Caucasella voultensis* (OPPEL). A series of eight transverse sections through the posterior part of a specimen from Sövér ravine, Bed K–1, Upper Bathonian. HNHM, M. 94.90. Original length of the specimen 11.0 mm. The distal parts of the crura were missing. Distances from the posterior end of the shell in mm.

Remarks: OPPEL (1965) erected the species *voultensis* on a figure by DESLONGCHAMPS (1859, fig. 8) representing a variety of "*Rhynchonella trigona*" QUENSTEDT, 1851. ROTHPLETZ (1886) gave the first revision and discussion of these forms and stated that "*R.*" *trigona* has more numerous (10–14) ribs and wider triangular outline, whereas "*R.*" *voultensis* is a narrower form with less than 10 ribs. A further difference can be stressed here, namely that *C. trigona* has a well-developed planarea in contrast to *C. voultensis* where it is ill-demarcated. According to these principles, the specimens from the Mecsek belong to *C. voultensis*, though one of them (Plate I: 2a–d) has 11 ribs.

Distribution: Bathonian and Callovian of Southern France and the Southern Carpathians. The Mecsek specimens came from Zengővárkony, Márévár valley (Bathonian) and the Sövér ravine (Upper Bathonian).

Family Wellerellidae LIKHAREV, 1958
Subfamily Lacunosellinae SMIRNOVA, 1963
Genus *Stolmorhynchia* BUCKMAN, 1918

Stolmorhynchia sp., aff. *stolidota* BUCKMAN, 1918
(Plate I: 3a–d)

v ? 1881 *Rhynchonella* cf. *spathica* LAM. – BÖCKH, Mecsekhegység, p. 95, pl. 9, fig. 11.

Material: 3, one well-preserved and two incomplete specimens.

Dimensions (mm):	L	W	T
M. 94.91.	10.5	9.8	6.4

Description:

External characters: Medium-sized rhynchonellids with subpentagonal outline. The lateral margins are slightly concave; the anterior margin is subrounded. The valves are nearly equally convex; the maximum convexity lies at about the half of the length. The beak is suberect to erect. The pedicle opening and delthyrium cannot be seen. The beak ridges are blunt and short; planarea not developed. The lateral commissures are gently arched dorsally; the first zig-zag deflections appear at the lateral extremities. The anterior commissure is uniplicate and has sharp deflections which show growing amplitude toward the centre. Two or three deflections lie in the plica. The surface of the shell is covered with rather coarse radial ribs and regular growth lines. The number of the ribs varies between 8 and 10.

Internal characters: These were not studied in detail due to the lack of suitable material. Through the thin and transparent shell, two strong dental plates can be seen in the pedicle valve but no median septum is visible in the brachial valve.

Remarks: Due to the paucity of material (two fragmentary and an immature specimen) and inadequate knowledge of the internal features, the open nomenclature is applied in the determination of this species. The general habit and the apparent lack of the median septum supports the attribution of this species to the Lacunosellinae and to *Stolmorhynchia* which is the main representative of the subfamily in the Middle Jurassic. The Mecsek specimens show affinity to several species of *Stolmorhynchia*, e.g. *S. prava* (ROTHPLETZ, 1886), *S. stolidota* BUCKMAN, 1918 and some other nominal species described from the Caucasus by KAMYSHAN & BABANOVA (1973). From among them, *S. stolidota* is the best documented originally (BUCKMAN 1918, pl. 13, fig. 12) and recently (PROSSER 1993, pl 1, fig. 6), therefore this name is used to express the relationship of the specimens studied. The somewhat larger specimen described by BÖCKH (1881) from the Bathonian of the Mecsek may also belong to this species.

Distribution: The Mecsek specimens came from the Hidas valley (Lower Bathonian) and the Sövér ravine (Middle Bathonian).

Genus *Dichotomosella* TCHOUMATCHENCO, 1987

This genus was introduced by TCHOUMATCHENCO (1987, p. 51) as a subgenus of *Lacunosella* WISNIEWSKA, 1932 on the basis of antidichotomous pattern of ribbing as a diagnostic difference. Recently SHI & GRANT (1993) put *Dichotomosella* to the rank of genus.

Dichotomosella galaczi sp. n.
(Plate I: 4a–c, Fig. 3)

Holotype: Hungarian Natural History Museum (Budapest), inventory number: M. 94.92.

Locus typicus: Hidas valley, Bed No. 19. (Mecsek Mts, Hungary)

Stratum typicum: Upper Bathonian, brownish-red, nodular limestone.

Derivatio nominis: After the surname of Dr. András GALÁCZ (Budapest), who collected the holotype.

Diagnosis: Medium-sized *Dichotomosella* of Bathonian age, with erect beak and few (1–2) deflections in the plica of the anterior commissure.

Material: 2 specimens, partly worn.

Dimensions (mm):	L	W	T
Holotype (M. 94.92.)	16.8	18.4	11.0
Sectioned paratype (M. 94.93.)	13.3	11.5	7.7

Description:

External characters: This is a medium-sized *Dichotomosella* with rounded subpentagonal outline. The lateral margins are straight and divergent with an apical angle slightly above 90°. The anterior margin is subrounded. The valves are nearly equally convex; the maximum convexity lies at about the half-length. The beak is erect to slightly incurved. The pedicle opening and delthyrium cannot be seen. The beak ridges are blunt or not developed. The lateral commissures are straight; the first weak deflections appear at the lateral extremities. The anterior commissure is highly uniplicate and has a few, low deflections in its lateral flanks. The central uniplication has a sharp, inverted V-shape; it shows one asymmetric deflection at its top (holotype), otherwise it is smooth. The surface of the shell is covered with 8–12 rather strong ribs except the anterior part of the fold and sulcus, where the ribs disappear or become fused (five ribs into one or two in the holotype).

Internal characters (Fig. 3): *Pedicle valve*: The delthyrial cavity is subquadrate to subtrigonal; the umbonal cavities are rounded triangular in cross-section. A very weak pedicle collar is present. The dental plates are slightly convergent ventrally. The hinge teeth are massive, wide and smooth; denticula are present. *Brachial valve*: Cardinal process is not well-marked. Median septum is not developed, only a rudimentary trace can be seen in the umbo. Septalium is missing; the hinge plates are fused posteriorly.

The outer hinge plates are subhorizontal and raise from the upper end of the inner socket ridges. The outer socket ridges are strong. The crural bases emerge dorsally and give rise to crura of falcifer type which curve toward the ventral valve.

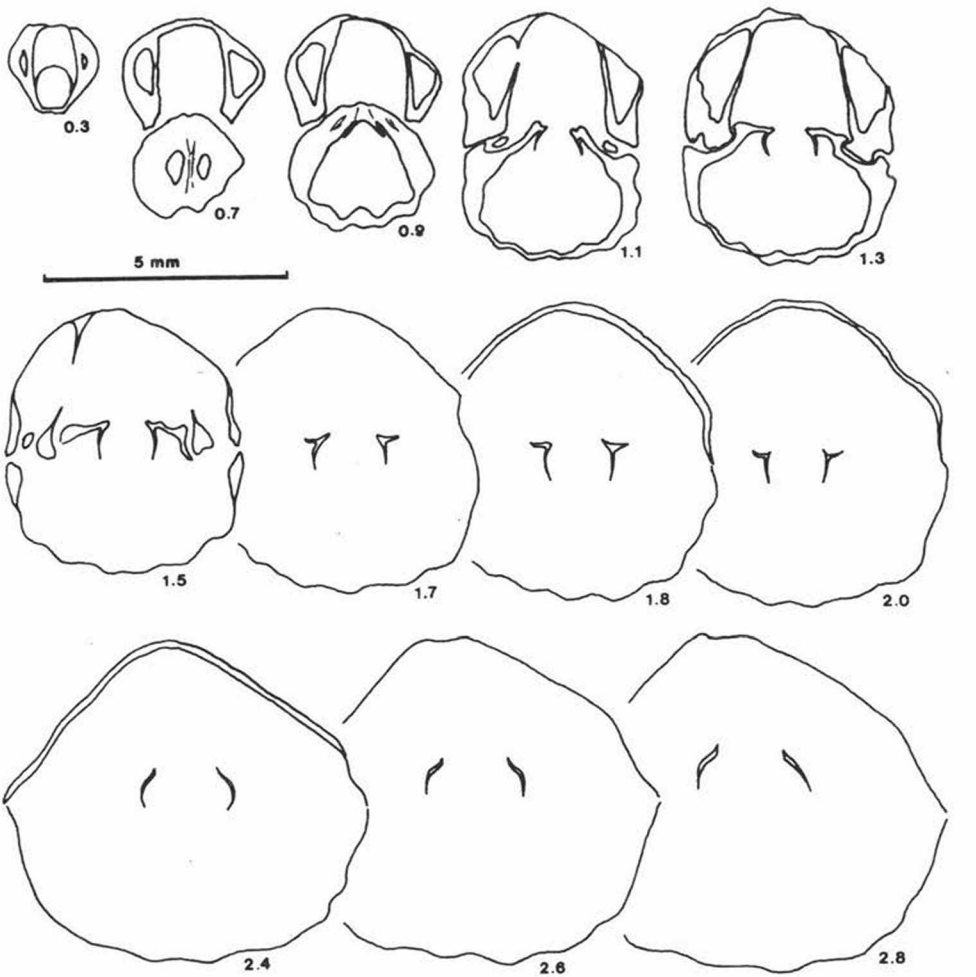


Fig. 3. *Dichotomosella galaczi* sp. n. A series of twelve transverse sections through the posterior part of the sectioned paratype from Márévári valley, Bathonian. HNHM, M. 94.93. Original length of the specimen 13.3 mm. The crura persisted to 3.0 mm from the posterior end of the specimen. Distances from the posterior end of the shell in mm.

Remarks: The more incurved (erect) beak, the fewer anterior ribs and the less expanded falcifer crura make *D. galaczi* different from *D. bourheddouensis* TCHOUMATCHENCO, 1987, the type species of *Dichotomosella*. Both the external and the internal features of *D. galaczi* suggest close relationship to *Lacunosella* and more precisely to *Dichotomosella*. Nevertheless, a strong morphological affinity to *Apringia* is seen as

well, especially in the development of the anterior commissure. The well-known Middle Jurassic representatives of *Apringia*, e.g. *A. atla* (OPPEL), *A. alontina* (DI STEFANO), *A. penninica* (UHLIG), are entirely smooth even posteriorly but some of the Early Jurassic species, e.g. *A. stoppanii* (PARONA), *A. altesinuata* (BÖSE) show weak posterior ribbing, with an "antidichotomous" pattern of ribbing similar to that seen on *Dichotomosella*.

Distribution: Márévár valley (Bathonian) and Hidas valley (Upper Bathonian).

Family Rhynchonellidae GRAY, 1848
Subfamily Cyclothyridinae MAKRIDIN, 1955
Genus *Capillirhynchia* BUCKMAN, 1918

Capillirhynchia brentoniaca (OPPEL, 1863)
(Plate I: 5a–e, 6a–c, Fig. 4)

v 1863 *Rhynchonella Brentoniaca* OPP. – OPPEL, Posidonomyen-Gesteinen, p. 215, pl. 7, figs. 12–14.
1896 *Rhynchonella brentoniaca* OPP. – PARONA, Sette Comuni, p. 35, pl. 2, figs. 27–28.
v 1935 *Acanthothyris* sp. – VADÁSZ, Mecsekhegység, p. 59.
? 1962 *Rhynchonelloidella brentoniaca* (OPPEL) – FERRARI, Rovereto, p. 115, fig. 4.
1982 *Rhynchonelloidella brentoniaca* (OPPEL, 1863) – BENIGNI et al., Asiago, p. 63, pl. 2, fig. 4a–e.

Material: 11 specimens, partly worn and fragmentary.

Dimensions (mm):	L	W	T
M. 94.94.	14.6	15.6	10.7
M. 94.95.	13.5	15.0	10.2
M. 94.96.	14.0	15.2	10.2

Description:

External characters: Small to medium sized rhynchonellids with rounded subpentagonal outline. The lateral margins are straight to slightly convex and divergent with an apical angle of 100–110°. The anterior margin is straight at the middle portion. The valves are nearly equally convex; the maximum convexity lies at about the half-length. The beak is suberect. The pedicle opening is very small; the delthyrium can not be seen. The beak ridges are blunt; planarea is not developed. The lateral commissures are nearly straight; a few weak deflections can be seen at the lateral extremities. The anterior commissure is widely uniplicate. The middle portion of the uniplication is straight and shows 8–10 weak deflections. The surface of the shell is covered with faint, radial capillae. The strength of the capillae increases anteriorly; their number remains more or less constant, ramification rarely occurs. Near the anterior margin of the adult specimens, the capillae become fused to (or substituted by) coarser riblets. The ratio between the number of capillae and riblets is 1 to 4 in average.

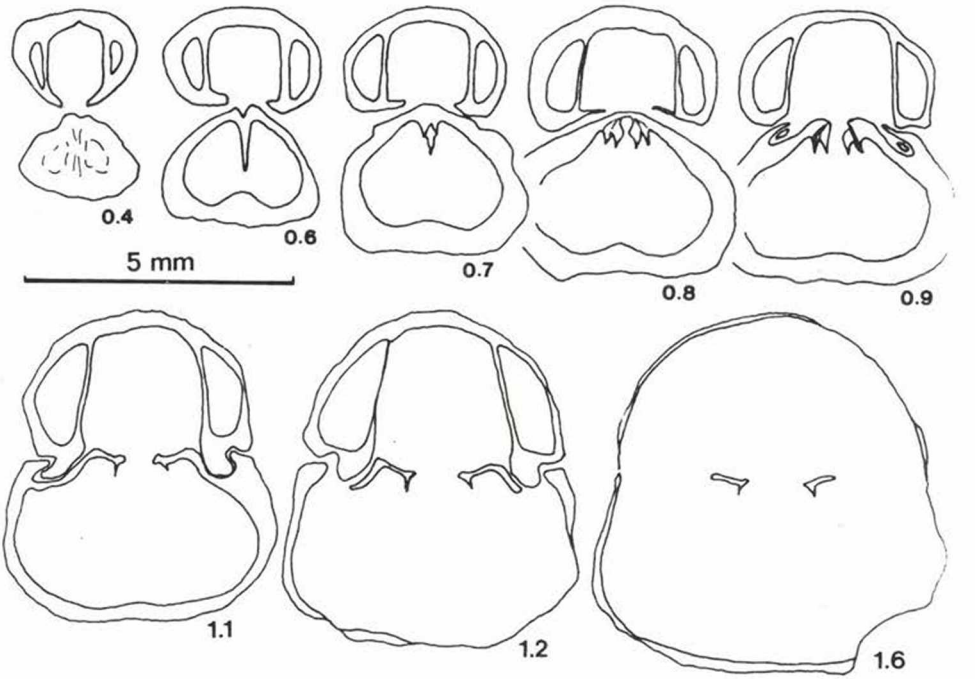


Fig. 4. *Capillirhynchia brentoniaca* (OPPEL). A series of eight transverse sections through the posterior part of a specimen from Hidas valley, Bed 17, Upper Bathonian. HNHM, M. 94.96. Original length of the specimen 14.0 mm. The crura persisted to 2.8 mm from the posterior end of the specimen. Distances from the posterior end of the shell in mm.

Internal characters (Fig. 4): *Pedicle valve*: The delthyrial cavity is subquadrate; the umbonal cavities are rounded subtrigonal in cross-section. The deltidial plates are thin. The dental plates are massive, subparallel, slightly convergent ventrally. The hinge teeth are massive, smooth, tapering laterally. Denticula are developed. *Brachial valve*: The cardinal process is dissected by a muscle trough. The median septum is rudimentary and appears only in the umbonal part. Septalium is not developed, instead the ventral part of the septum becomes bifurcate anteriorly and supports the crural bases. The outer hinge plates are subhorizontal and raise from the ventral end of the inner socket ridges. The outer socket ridges are well-developed. The crural bases emerge dorsally from the outer hinge plates and give rise to crura of prefalcifer type.

Remarks: This species was previously described and well illustrated by OPPEL (1863), PARONA (1896) and BENIGNI et al. (1982). All these descriptions and/or figures show clearly the most important external features, namely the capillation and the anterior ribbing, i.e. the antidichotomous costulation. Based on these, the Mecsek specimens can be attributed to *Capillirhynchia brentoniaca* with great certainty. FERRARI (1962) described this species with the illustration of serial sections which fit well with those presented herein. He, and subsequently BENIGNI et al. (1982) attributed this species to *Rhynchonelloidella* what can certainly not endorsed, since this genus has an almost

"cynocephalous" shape and strong ribbing throughout the shell. On the other hand, the very characteristic antidichotomous costulation (i.e. capillation and anterior ribbing) of the species *brentoniaca* supports its attribution to the genus *Capillirhynchia*.

KAMYSHAN (1968) and KAMYSHAN & BABANOVA (1973) described a series of new species of *Capillirhynchia* from the Middle Jurassic of the Caucasus (*C. kardonikensis*, *C. urupensis*, *C. vjalovi*) which do not seem to be essentially different from *C. brentoniaca*. Similar is the case of "*Rhynchonella*" *beneckei* NEUMAYR, 1871 described from the Middle Jurassic of the Pieniny Klippen Belt (UHLIG 1878). Nevertheless, it would not be advisable to include these forms definitely in *C. brentoniaca* without the study of their original specimens.

Distribution: Bajocian and Bathonian of the Southern Alps. The Mecsek specimens came from the Bathonian of Hidas valley but further specimens were found in the Upper Bajocian and lowermost Callovian beds of the Mecsek.

Order Terebratulida WAAGEN, 1883
Suborder Terebratulidina WAAGEN, 1883
Superfamily Terebratulacea GRAY, 1840
Family Pygopidae MUIR-WOOD, 1965
Genus *Linguithyris* BUCKMAN, 1918

Linguithyris nepos (CANAVARI, 1882)
(Plate I: 7a–c, 8a–c, 9a–c, Fig. 5)

1882 *Terebratula nepos* n. f. – PARONA & CANAVARI, Brachiopodi oolitici, p. 342, pl. 10, figs 1–4.
1886 *Terebratula nepos* CANAVARI – ROTHPLETZ, Vilser Alpen, p. 116, pl. 5, figs. 20, 22, 24.
v 1935 *Terebratula* cf. *excavata* DESL. – VADÁSZ, Mecsekhegység, p. 60.
1937 *Pygope nepos* CANAV. – VINASSA DE REGNY, Fossili giuresi, p. 85, pl. 2, figs 29–33.
1962 *Glossothyris nepos* CANAVARI – JARRE, Révision du genre *Pygope*, p. 100, pl. J, fig. 2.
1962 *Linguithyris nepos* (CANAVARI) – FERRARI, Rovereto, p. 144, pl. 10, fig. 7.
1972 *Nucleata nepos* (CANAVARI, 1882) – FERRARI & MANARA, Monte Peller, p. 315, pl. 30, figs. 1–2.
1982 *Linguithyris nepos* (CANAVARI, 1882) – BENIGNI et al., Asiago, p. 66, pl. 2, figs. 13–14.

Material: 5 well preserved specimens.

Dimensions:	L	W	T
M. 94.97.	16.5	19.6	10.0
M. 94.98.	16.4	20.4	9.8
M. 94.99.	15.5	17.8	10.7
M. 94.100.	14.1	15.0	9.2

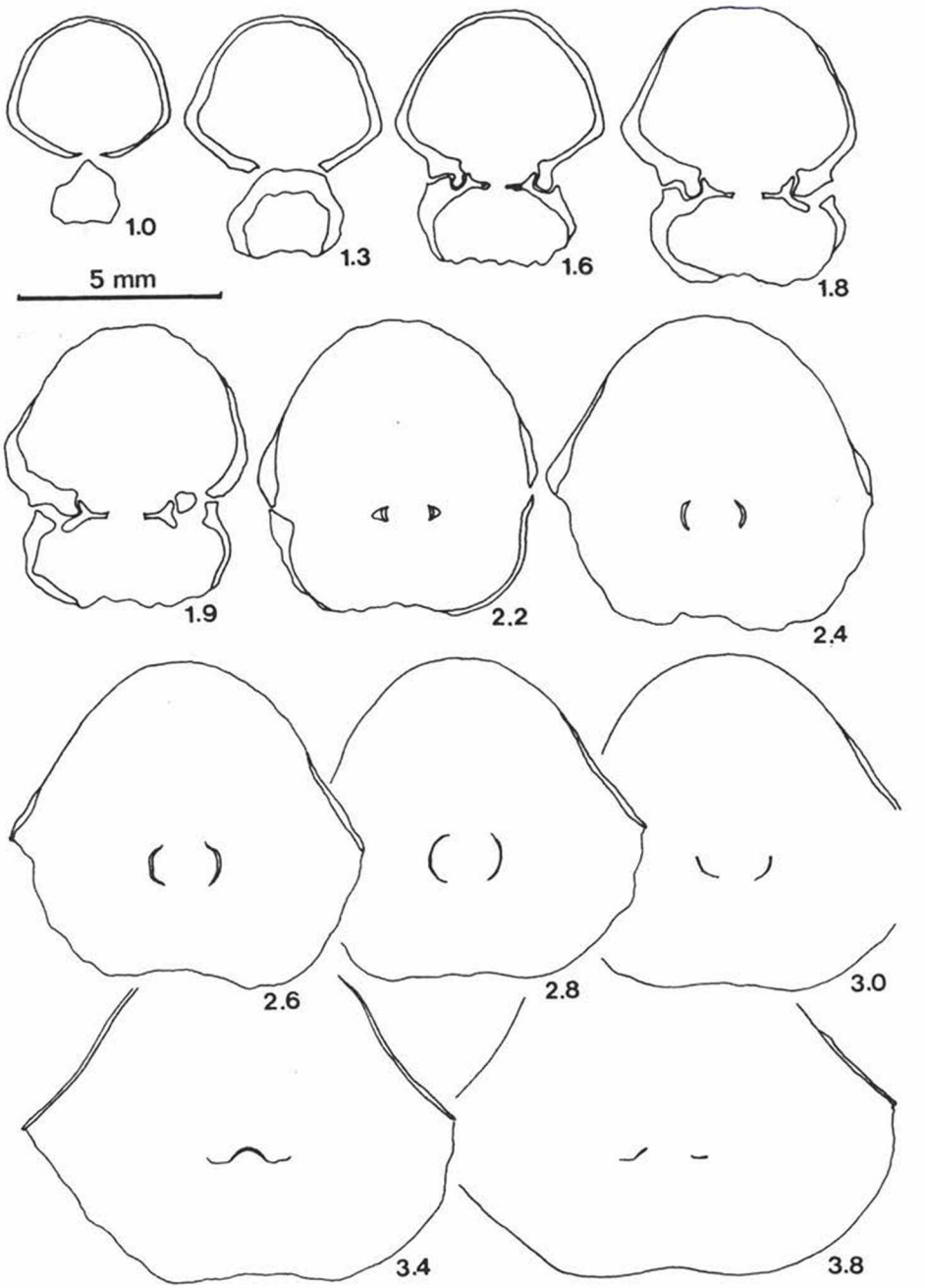


Fig. 5. *Linguithyris nepos* (CANAVARI). A series of twelve transverse sections through the posterior part of a specimen from Sövér ravine, A-beds, Upper Bathonian. HNHM, M. 94.100. Original length of the specimen 14.1 mm. The brachidium persisted to 3.9 mm from the posterior end of the specimen. Distances from the posterior end of the shell in mm.

Description:

External characters: Medium-sized *Linguithyris* with rounded, laterally expanded subtrigonal outline. The lateral margins are slightly sinuous, then become convex and arch continuously into the anterior margin. The anterior margin shows two anterior extremities; the middle portion is concave. The pedicle valve is more convex than the brachial one; the maximum convexity lies in the posterior one-third of the length. The beak is erect to slightly incurved and is truncated by a small, circular pedicle opening. The delthyrium cannot be seen. The development of the beak ridges is variable: they may be rather sharp on the less convex specimens, whereas the more globose specimens have no distinct beak ridges. There is a definite, almost straight hinge margin which meets the lateral margins at an obtuse angle. The lateral commissure is straight; the anterior commissure is deeply sulcate. The width of the sinus is variable from the one-third to the half of the total width of the shell. The depth of the sinus equals to its width. The sulcus of the brachial valve is long; it is very narrow but present at the posterior part. The pedicle valve is not carinate. The surface of the shell is not ornamented; only fine, sometimes irregularly spaced growth lines are seen.

Internal characters (Fig. 5): *Pedicle valve*: The delthyrial cavity is rounded subtrigonal in cross-section. The hinge teeth are moderately long, rather narrow. Denticula are well-developed. *Brachial valve*: The cardinal process is low and flat. The outer socket ridges are well-developed, sharp. The inner socket ridges are high and lean over the sockets. The outer hinge plates are horizontal and grow from the inner edges of the socket ridges. The crural bases are developed at the innermost points of the outer hinge plates; the crura are similar to the falcifer type. The crural processes are rather high, incurved. The loop is short, triangular, with gently arched transverse band and ends in two divergent tips.

Remarks: The morphological similarity of the Mecsek specimens to *L. nepos* is remarkable, still the specific identification needs a wider interpretation of this species. Namely, from PARONA & CANAVARI (1882) to FERRARI (1962), *L. nepos* was consequently described as having rather small size (less than 15 mm wide) and as being restricted to the Aalenian. On the other hand, the Mecsek specimens are large (around 20 mm wide) and came from the Bathonian. Recently BENIGNI et al. (1982) described a few large specimens of *L. nepos* collected from the higher part of the Middle Jurassic of the Southern Alps. By this, the range of this species (both in size and in stratigraphy) became considerably wider and the identification of the Mecsek specimens seems to be justified.

At the same time, this wider interpretation of *L. nepos* raises the problem of the specific identity of *L. nepos* and *L. bifida* (ROTHPLETZ, 1886) (cf. BENIGNI et al. 1982). Unfortunately, ROTHPLETZ (1886, p. 114–116) did not give really diagnostic differences between the two species. He laconically stated that they "unterscheiden sich recht auffallend" and referred to the difference in lateral view. The profuse illustration (l. c. pl. 5, figs 17–19, 21, 23, 25–27 for *bifida* and pl. 5, figs 20, 22, 24 for *nepos*) however does not at all supports his statements. All the figured specimens can be interpreted as representatives of a single, variable species, where the smaller individuals were called *nepos*. In spite of having this opinion, the present author was unwilling to list *L. bifida* in the synonymy of *L. nepos* for two reasons. One is that it would not be satisfactory without studying the original material; the other is that *L. bifida* is the type

species of *Linguithyris* and its deletion (as the junior synonym of *nepos*) might lead to nomenclatorial confusion.

Distribution: Middle Jurassic (Aalenian and Bajocian) of the Southern Alps and the Northern Calcareous Alps. The Mecsek specimens came from the Bathonian of the Hidas valley and the Sövér ravine.

Superfamily Loboidothyridacea MAKRIDIN, 1964
Family Muirwoodellidae TCHORSZHEVSKY, 1974
Subfamily Karadagithyridinae TCHORSZHEVSKY, 1974
Genus *Karadagella* BABANOVA, 1965

Karadagella zorae TCHORSZHEVSKY & RADULOVIĆ, 1984
(Plate II: 1a–c, 2a–c, 3a–c, 4a–c, 5a–c, 6a–c, Fig. 6, 7)

v 1935 *Terebratula dorsoplicata* SUESS – VADÁSZ, Mecsekhegység, p. 58.
1984 *Karadagella zorae* n. sp. – TCHORSZHEVSKY & RADULOVIĆ, Carpathians and Carpatho-Balkanides, p. 151, pl. 3, figs. 9–12, fig. 14.
1987 *Cererithyris* sp. aff. *intermedia* (Sowerby, 1812) – TÖRÖK et al., Zobákpuszta, p. 192, pl. 2, figs 2, 3, 4.

Material: 357 specimens of variable state of preservation.

Dimensions:	L	W	T
M. 94.102.	23.4	19.1	12.0
M. 94.103.	25.4	20.0	12.9
M. 94.104.	28.0	24.3	14.2
M. 94.105.	29.0	22.2	14.6
M. 94.106.	31.4	24.5	15.5
M. 94.107.	30.2	25.8	14.5

The size-frequency distribution of 90 measured specimens is shown in Fig. 8.

Description:

External characters: Medium-sized to large terebratulids with variable outline from elongate oval to rounded subtrigonal. The lateral margins are gently convex and pass gradually into the rounded trapezoidal anterior margin. The pedicle valve is strongly and uniformly convex, whereas the brachial valve is almost flat, except the umbonal part. The beak is erect to slightly incurved and is truncated by a rather large, mostly subcircular pedicle opening. The delthyrium is concealed by the beak. The beak ridges are blunt or missing. The lateral commissure is arched ventrally with a point of inflection at the lateral extremities. The anterior commissure is widely uniplicate; the low trapezoidal uniplication is straight in the middle portion. The surface of the shell is not ornamented; only irregularly spaced growth lines and rugae can be seen.

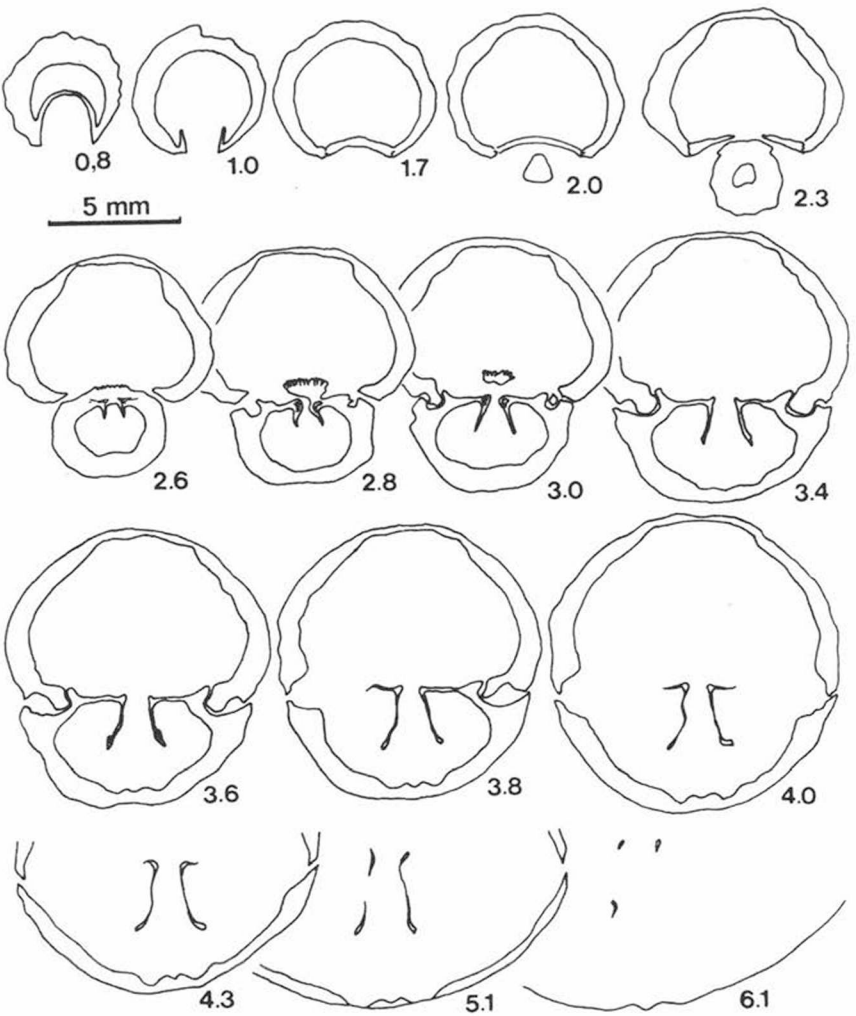


Fig. 6. *Karadagella zorae* TCHORSZHEVSKY & RADULOVIĆ. A series of fifteen transverse sections through the posterior part of a specimen from Hidas valley, Bathonian. HNHM, M. 94.108. Original length of the specimen 29.1 mm. The distal part of the brachidium was missing. Distances from the posterior end of the shell in mm.

Internal characters (Figs 6, 7): *Pedicle valve*: The pedicle collar is well-developed. The deltidial plates form a symphytium posteriorly. The delthyrial cavity is subcircular in cross-section. The hinge teeth are massive, stout; denticula are developed. *Brachial valve*: The cardinal process is well-developed, crenulated, and projects in the delthyrial cavity. The outer socket ridges are strong. The inner socket ridges are high and lean a little over the sockets. The outer hinge plates are wide, horizontal and grow from the inner edges of the socket ridges. The crural bases emerge dorsally from the posterior part of the hinge plates; at the plane of articulation there is a tube-like hollow in the

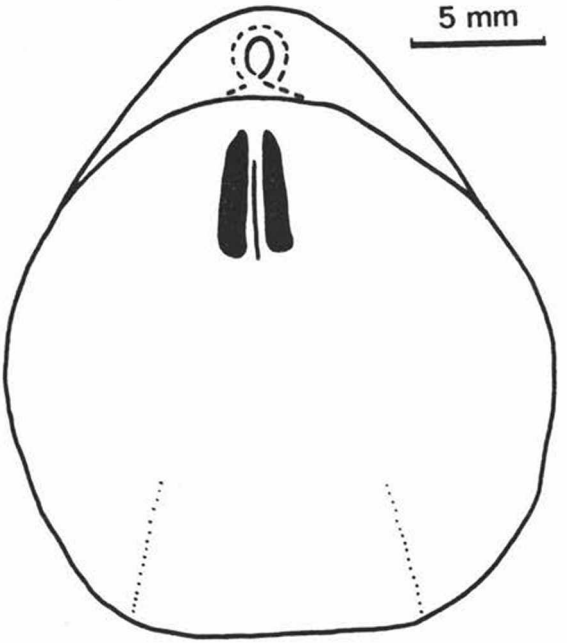
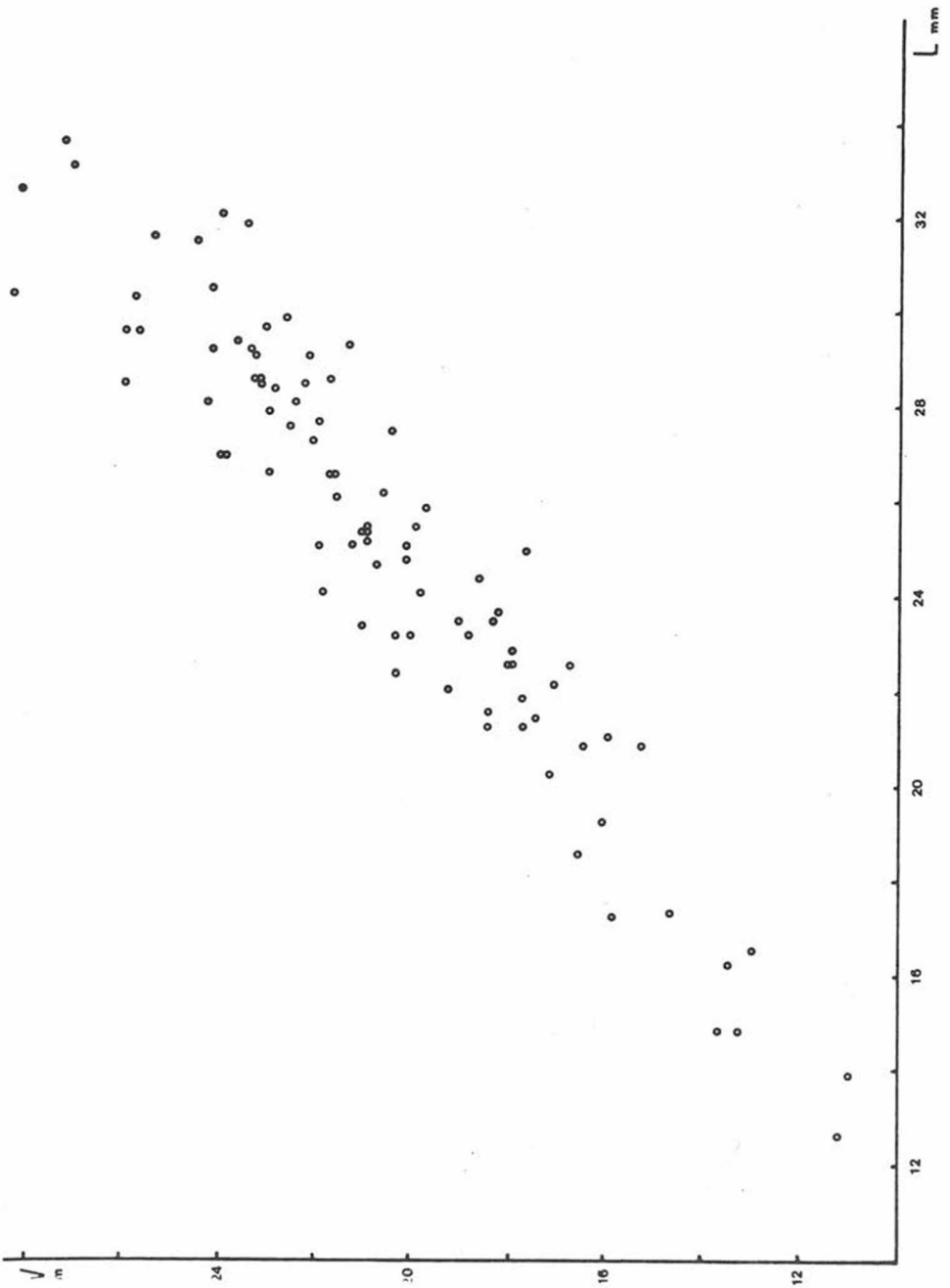


Fig. 7. *Karadagella zorae* TCHORSZHEVSKY & RADULOVIĆ. Dorsal view of a specimen from the Mecsek Mts (locality not specified), Bathonian, showing the adductor muscle scars. HNHM, M. 94.101.

ventral ridge of the crural bases. The crura are similar to the falcifer type (Karadagella-type of TCHORSZHEVSKY 1974), they are pending deeply into the umbonal cavity of the brachial valve. The crural plates are long, thin and subparallel, their dorsal part bends laterally and bears thickenings, club-shaped in cross-section. The loop is not known (broken off). The dorsal adductor muscle scars (Fig. 7) are rather short, narrow, parallel and very closely spaced.

Remarks: *Karadagella zorae* was described by TCHORSZHEVSKY & RADULOVIĆ (1984) together with other two new species (*K. milenae, K. annickae*). They are different from the type species of *Karadagella, K. moisseievi* BABANOVA (BABANOVA 1965, p. 96) which has a remarkably tiny, depressed umbo. At the same time, K. *milenae, annickae* and *zorae* are rather similar externally and, even by TCHORSZHEVSKY & RADULOVIĆ (1984), notable differences were found only in the internal features. Based on these, namely the well-developed cardinal process, the crural base ridges and the dorsally divergent crural plates, the Mecsek specimens show the closest relationship to *K. zorae*.

Distribution: Bathonian-Callovian of the Pieniny Klippen Belt (Ukraine). The representatives of this species were found in all sampled localities of the Bathonian of the Mecsek.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Genus *Karadagithyris* TCHORSZHEVSKY, 1974

Karadagithyris eduardi sp. n.
(Plate I: 10a–c, Fig. 9)

1984 *Karadagithyris gerda* (OPPEL, 1863) – TCHORSZHEVSKY & RADULOVIĆ, Carpathians and Carpatho-Balkanides, p. 152, pl. 3, figs. 13–16, 17–20, fig. 15.

Holotype: Hungarian Natural History Museum (Budapest), inventory number: M. 94.109.

Locus typicus: Hidas valley, Bed No. 45 (Mecsek Mts, Hungary).

Stratum typicum: Lower Bathonian, brownish-red, nodular limestone.

Derivatio nominis: after the name of Dr. Eduard Stanislavovich TCHORSZHEVSKY, famous brachiopod worker (Kharkov, Ukraine).

Diagnosis: Large *Karadagithyris* with massive, incurved beak, strongly convex pedicle valve and uniplicate anterior commissure.

Material: 5 specimens of variable state of preservation.

Dimensions:	L	W	T
Holotype (M. 94.109)	35.5	25.3	19.4
Sectioned paratype (M. 94.110.)	31.4	24.0	17.5

Description:

External characters: This is a large terebratulid with oval, elongate drop-shaped outline. The lateral margins are straight and pass into the anterior margin along a continuous curve. The anterior margin is rounded subtrapezoidal. The pedicle valve is strongly and uniformly convex, the brachial valve is gently convex. The beak is incurved and is truncated by a rather large, subcircular to elongate oval pedicle opening. The beak ridges are blunt; a planarea-like shallow depression is developed on the pedicle valve. The lateral commissure is gently sinuous; at first it is slightly arched dorsally then it is deflected ventrally at the lateral extremities. The anterior commissure is uniplicate; the low but well-demarcated, trapezoidal plica is straight in the middle portion. Except the fine growth lines, the surface of the shell is not ornamented. Two blunt radial ridges arise at the middle part of the brachial valve and run to the corners of the uniplication.

Fig. 8. The size-frequency distribution of 90 specimens of *Karadagella zorae* TCHORSZHEVSKY & RADULOVIĆ. L = length, W = width

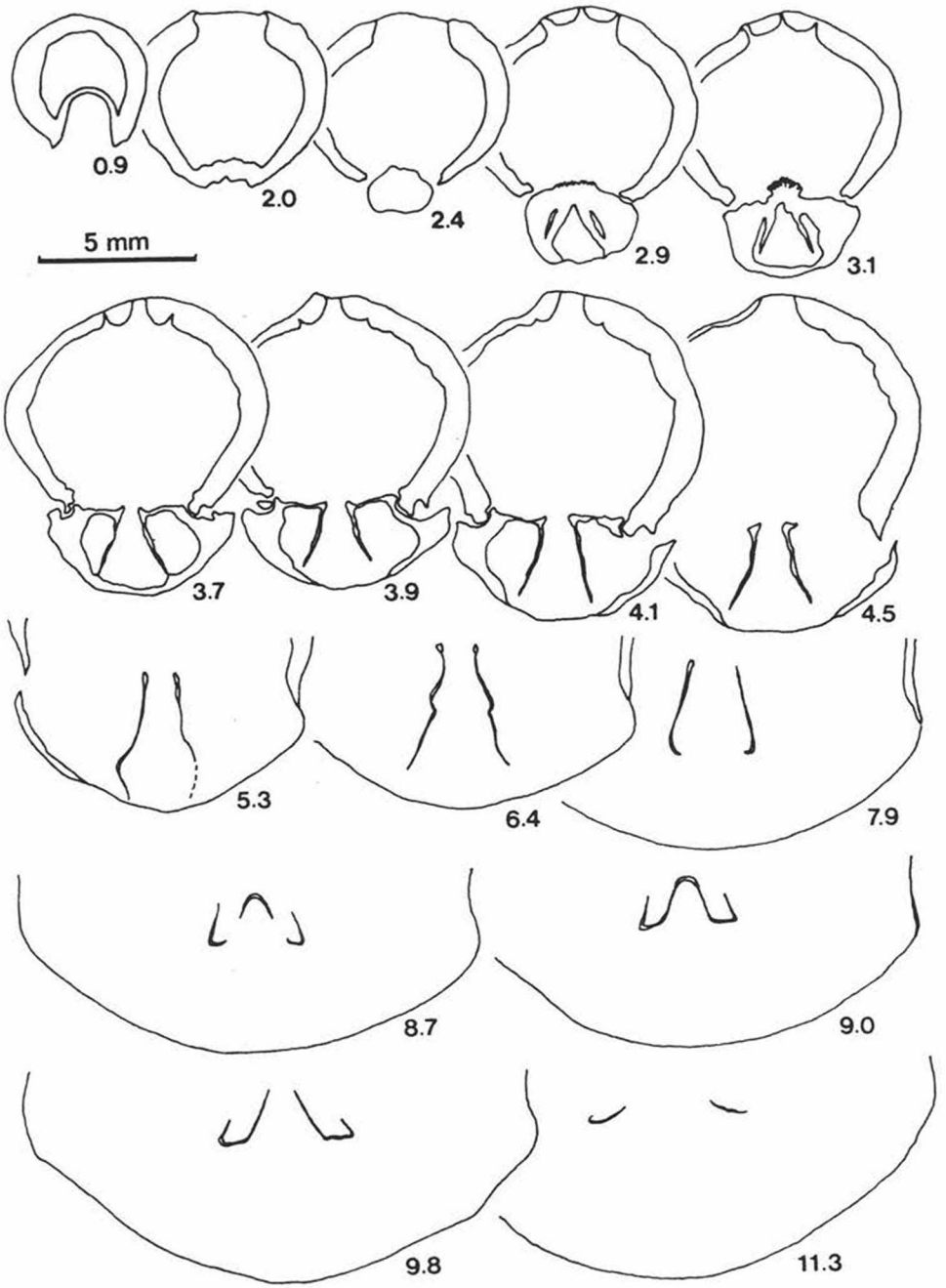

Fig. 9. *Karadagithyris eduardi* sp. n. A series of sixteen transverse sections through the posterior part of the sectioned paratype from Sövér ravine, Bed L–1, Lower Bathonian. HNHM, M. 94.110. Original length of the specimen 31.4 mm. The brachidium persisted to 13.1 mm from the posterior end of the specimen. Distances from the posterior end of the shell in mm.

Internal characters (Fig. 9): *Pedicle valve*: The pedicle collar is well-developed. The fused deltidial plates form a symphytium. The delthyrial cavity is subcircular in cross-section. On the ventral side very deep adductor muscle scars and grooves can be seen. The hinge teeth are stout, denticula are developed. *Brachial valve*: The cardinal process is well-developed, high and strongly crenulated. The outer socket ridges are wide and strong. The inner socket ridges are low and lean moderately over the sockets. The outer hinge plates grow from the top of the inner socket ridges, they are subhorizontal and rather thin. The crural bases appear in the umbonal cavity as dorsally divergent plates between the cardinal process and the dorsal valve floor. They are connected to the outer hinge plates forming ventral ridges. The crura are similar to the falcifer type and are supported by crural plates reaching the valve floor (Karadagithyris-type of TCHORSZHEVSKY 1974). The loop is rather wide subtrigonal, ending in long, divergent tips. The transverse band is highly arched and projects a little posteriorly.

Remarks: The Mecsek specimens described here as *Karadagithyris eduardi*, new species, show almost perfect identity, both externally and internally, with those presented by TCHORSZHEVSKY & RADULOVIĆ (1984) under the name *Karadagithyris gerda* (OPPEL). This new species is very markedly different from "*Terebratula*" *gerda* OPPEL, 1863 which has a short and wide, rounded subpentagonal outline, equiglobose shells and almost perfectly rectimarginate lateral and anterior commissures, in contrast to the elongate oval outline, the inequiglobose shells and uniplicate anterior margin of *K. eduardi*. The present author had the opportunity to study the type (figured) specimen of "*T.*" *gerda* in the Bayerische Staatssammlung (München) and is convinced that the figures given by OPPEL (1863, pl. 5, fig. 1a–c) are reliable.

It is worth mentioning that "*T.*" *gerda* was collected in great number from the Bajocian of the Bakony (Hungary). Recent studies on their internal morphology has revealed that they have relatively short crural plates, not reaching the floor of the dorsal valve, i.e. the "true" *gerda* may belong rather to *Karadagella* than to *Karadagithyris*.

The large size and the uniplicate anterior commissure seem to differentiate *K. eduardi* from all other known species of *Karadagithyris*.

Distribution: Undivided Bathonian-Callovian of the Pieniny Klippen Belt (Ukraine) and the Danubic unit of the Yugoslavian Carpatho-Balkanides. The Mecsek specimens came from the Bathonian of the Hidas valley and the Sövér ravine.

Suborder Terebratellidina MUIR-WOOD, 1955
Superfamily Terebratulacea KING, 1850
Family Dallinidae BEECHER, 1893
Subfamily Kingeninae ELLIOTT, 1948
Genus *Zittelina* ROLLIER, 1919

Zittelina ? *beneckei* (PARONA, 1880)
(Plate II: 7a–c, 8a–c, 9a–f, Figs. 10, 11)

1880 *Waldheimia Beneckei* n. sp. – PARONA, Strati a Posidonomya, p. 274, pl. 5, fig. 24a–c.
1886 *Terebratula* mut. *brica* DE GREG. – DE GREGORIO, Ghelpa, p. 18, pl. 2, fig. 46.

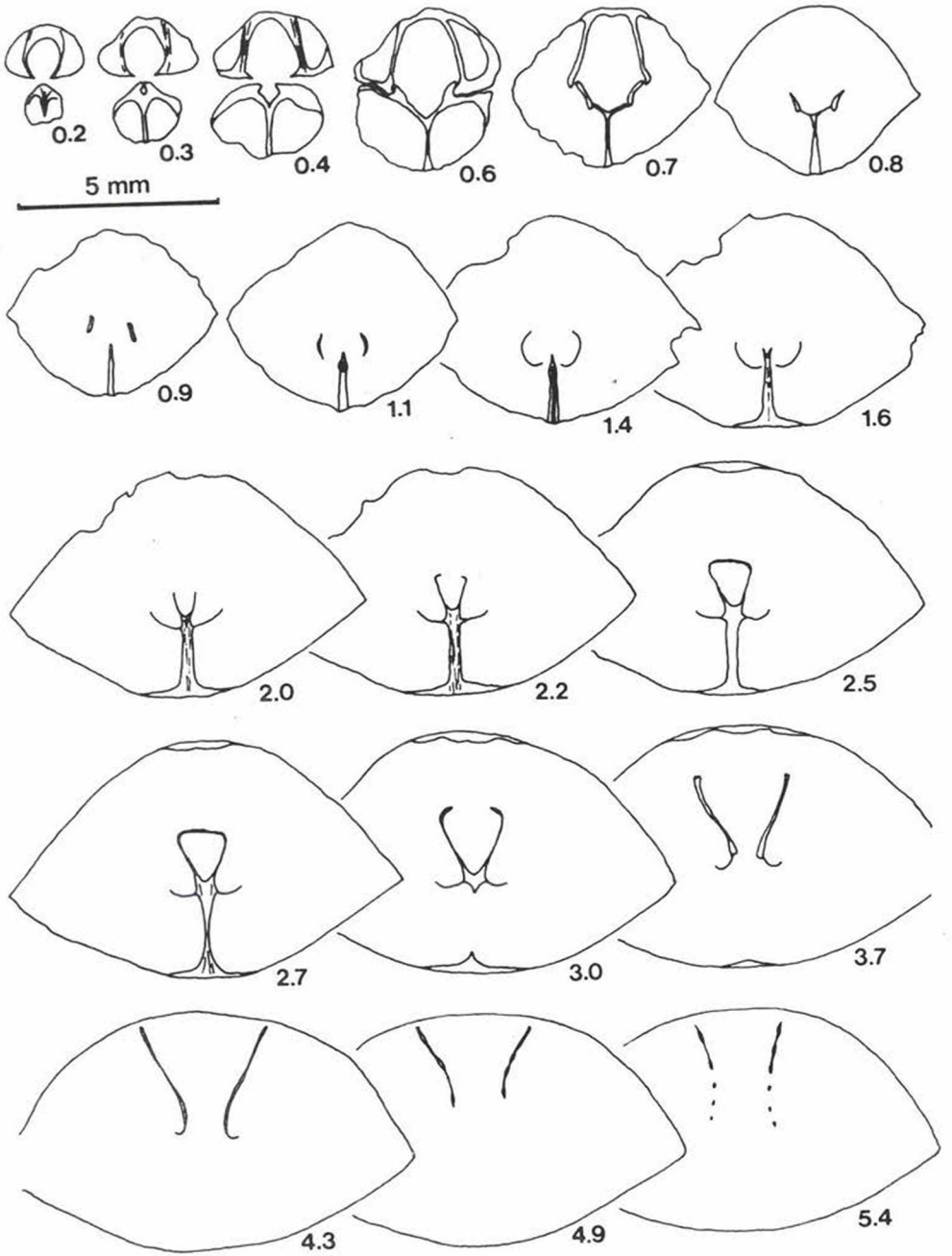

Fig. 10. *Zittelina ? beneckei* (PARONA). A series of nineteen transverse sections through a juvenile(?) specimen from Hidas valley, Bed 15, Upper Bathonian. HNHM, M. 94.114. Original length of the specimen 9.4 mm. The brachidium persisted to 5.7 mm from the posterior end of the specimen. Distances from the posterior end of the shell in mm.

1886 *Terebratula abrupta* DE GREG. – ibid., p. 18, pl. 2, fig. 47.
1886 *Terebratula abruturgida* DE GREG. – ibid. p. 18, pl. 3, fig. 1.
1886 *Terebratula* mut. *miopina* DE GREG. – ibid. p. 18, pl. 3, figs. 2, 3.
1886 *Terebratula elga* DE GREG. – ibid. p. 18, pl. 3, fig. 4.
1886 *Terebratula felina* DE GREG. – ibid. p. 18, pl. 3, fig. 5.
1886 *Terebratula mirilla* DE GREG. – ibid. p. 18, pl. 3, fig. 6.
1886 *Terebratula Renardi* DE GREG. – ibid. p. 18, pl. 3, fig. 7.
1886 *Terebratula cavendina* DE GREG. – ibid. p. 18, pl. 3, fig. 8.
1886 *Terebratula* mut. *propecavendina* DE GREG. – ibid. p. 19, pl. 3, fig. 9.
1886 *Terebratula* mut. *tricavendina* DE GREG. – ibid. p. 19, pl. 3, fig. 10.
1896 *Waldheimia Beneckei* PAR. – PARONA, Sette Comuni, p. 31, pl. 2, figs 19, 20.

Material: 27 specimens of variable state of preservation.

Dimensions:	L	W	T
M. 94.111.	8.2	8.1	5.5
M. 94.112.	10.5	10.3	8.0
M. 94.113.	9.8	10.4	7.4

Description:

External characters: this is a very small, globose terebratulid, with rounded subpentagonal outline. The lateral margins are nearly straight at first, then become convex and pass gradually into the rounded trapezoidal anterior margin. The valves are inequiglobose, the pedicle valve is very strongly convex. The maximum convexity lies at the posterior one-third of the length. The tiny, depressed beak is incurved and is truncated by a small, subcircular pedicle opening. The delthyrium is concealed by the beak. The lateral commissure is straight and bends a little ventrally. According to the degree of this bending, the anterior commissure can be described as uniplicate to parasulcate. The uniplication (or the middle plica of the parasulcation) is wide and low. The surface of the shell is covered by rather regularly spaced growth lines.

Internal characters (Figs 10, 11): *Pedicle valve*: The delthyrial cavity is subcircular to oval; the umbonal cavities are rounded subtrigonal in cross-section. The dental plates are strong and convergent ventrally. The hinge teeth are short and weak. In the mature (gerontic ?) specimen (Fig. 11) the inner part of the umbo is vastly thickened by secondary shell material (callus). *Brachial valve*: There is no cardinal process but a narrow, deep notch can be interpreted as a muscle trough. This continues in a deep, V-shaped septalium, formed by the fused inner hinge plates. The septalium is supported by a strong median septum. The septalium persists well beyond the plane of articulation, here the crural bases became free from the inner socket ridges but are still attached to the median septum by the septalium. The crura are free and similar to the falcifer type; the crural processes are incurved. Further anteriorly, the median septum remains high and very massive, it takes part in the development of the loop. Both the descending and the ascending branches are connected to the median septum (reinforced with callus). The hood is well-developed; it is circular (in the adult) or subtrigonal (in the juvenile) in cross-section. The frenuliniform to terebrataliiform loop bears lateral spines (in the adult specimen) and ends in numerous, long anterior spurs.

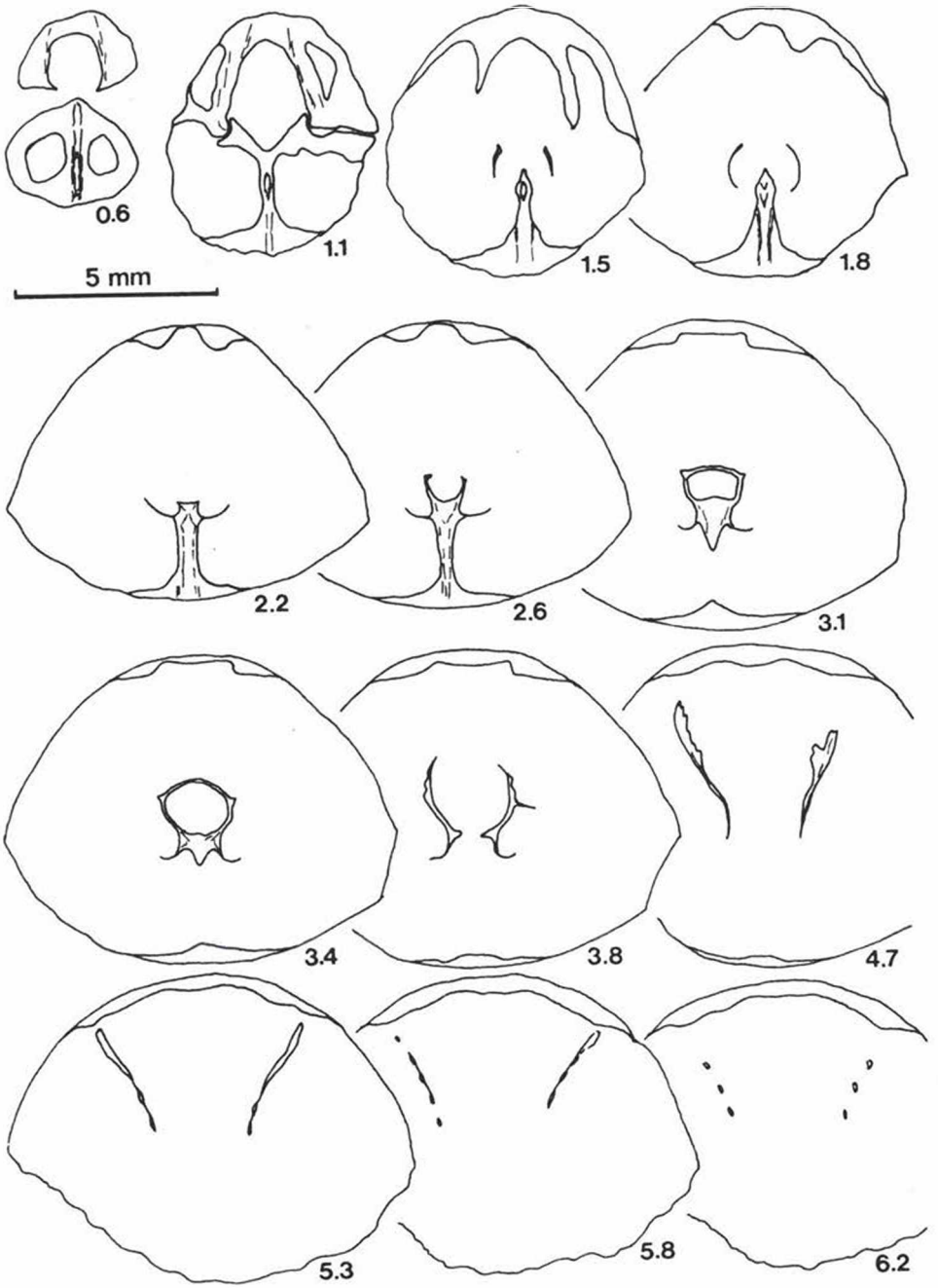

Fig. 11. *Zittelina ? beneckei* (PARONA). A series of thirteen transverse sections through a mature specimen from Hidas valley, Bed 20, Upper Bathonian. HNHM, M. 94.115. Original length of the specimen 10.0 mm. The brachidium persisted to 6.3 mm from the posterior end of the specimen. Distances from the posterior end of the shell in mm.

Remarks: The Mecsek specimens can well be identified with "*Waldheimia*" *beneckei* described by PARONA (1880) from the Bathonian of the Southern Alps. DE GREGORIO (1886) erected eleven new species and mutations, all belonging to the "group of *T. beneckei*". They are regarded as synonymous with "*W.*" *beneckei*, in accordance with the opinion of PARONA (1896).

"*Waldheimia beneckei*" HAAS & PETRI, 1882, from the Aalenian of Alsace-Lorraine, is a junior homonym of this species.

The attribution of "*W.*" *beneckei* to the genus *Zittelina* is tentative. There are no Middle Jurassic genera of Kingeninae (or other Dallinidae) with appropriate external and internal (loop) morphology. Probably a new genus should be created for this and some other, externally similar and possibly related forms ("*W.*" *boehmi* PARONA, 1896; "*W.*" *truncatella* ROTHPLETZ, 1886). The closest relationship has to be sought in the Late Jurassic, where, besides *Zittelina*, some recently described genera show similar features (e. g. *Tiaretithyris* TCHOUMATCHENCO, 1986 and *Oppeliella* TCHORSZHEVSKY, 1989). From among them, at the moment, *Zittelina* seemed to be the most suitable to embrace the species *beneckei*.

Distribution: Bathonian of the Southern Alps. The Mecsek specimens came from the Bathonian of the Hidas valley, Sövér ravine, Óbánya valley and Síngödör.

Acknowledgements

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Explanation to plates

Plate I.

In each case **a** is the dorsal view, **b** is the anterior view (brachial valve upward), **c** is the lateral view, **d, e** or **f** are enlargements. The specimens are deposited in the Hungarian Natural History Museum. Photographs taken by the author.

1a-d. *Caucasella voultensis* (Oppel). Zengővárkony, Mészkemence, Bathonian. M. 94.89. (a-c: x 1, d: x 2.5)

2a-d. *Caucasella voultensis* (Oppel). Sövér ravine, Bed K-1, Upper Bathonian. M. 94.88. (a-c: x 1, d: x 2.5)

3a-d. *Stolmorhynchia* sp., aff. *stolidota* BUCKMAN. Hidas valley, Bed 50, Lower Bathonian. M. 94.91. (a-c: x 1, d: x 2.5)

4a-c. *Dichotomosella galaczi* sp. n., holotype. Hidas valley, Bed 19, Upper Bathonian. M. 94.92. (x 1)

5a-e. *Capillirhynchia brentoniaca* (OPPEL). Hidas valley, Bathonian. M. 94.94. (a-c: x 1, d-e: x 2.5)

6a-c. *Capillirhynchia brentoniaca* (OPPEL). Hidas valley, Bed 10-14, Upper Bathonian. M. 94.95. (x 1)

7a-c. *Linguithyris nepos* (CANAVARI). Hidas valley, Bathonian. M. 94.98. (x 1)

8a-c. *Linguithyris nepos* (CANAVARI). Hidas valley, Bed 10, Upper Bathonian. M. 94.97. (x 1)

9a-b. *Linguithyris nepos* (CANAVARI). Hidas valley, Bathonian. M. 94.99. (x 1)

10a-c. *Karadagithyris eduardi* sp. n., holotype. Hidas valley, Bed 45, Lower Bathonian. M. 94.109. (x 1)

Plate II.

In each case **a** is the dorsal view, **b** is the anterior view (brachial valve upward), **c** is the lateral view, **d, e** or **f** are enlargements. The specimens are deposited in the Hungarian Natural History Museum. Photographs taken by the author.

1a–c. *Karadagella zorae* TCHORSZHEVSKY & RADULOVIĆ. Hidas valley, Bed 15, Upper Bathonian. M. 94.102. (x 1)

2a–c. *Karadagella zorae* TCHORSZHEVSKY & RADULOVIĆ. Hidas valley, Bed 8, Upper Bathonian. M. 94.103. (x 1)

3a–c. *Karadagella zorae* TCHORSZHEVSKY & RADULOVIĆ. Hidas valley, Bathonian. M. 94.104. (x 1)

4a–c. *Karadagella zorae* TCHORSZHEVSKY & RADULOVIĆ. Hidas valley, Bed 8, Upper Bathonian. M. 94.105. (x 1)

5a–c. *Karadagella zorae* TCHORSZHEVSKY & RADULOVIĆ. Hidas valley, Bed 20, Upper Bathonian. M. 94.106. (x 1)

6a–c. *Karadagella zorae* TCHORSZHEVSKY & RADULOVIĆ. Ófalu, "Kalktal", Bathonian. M. 94.107. (x 1)

7a–c. *Zittelina* ? *beneckei* (PARONA). Sövér ravine, Bed K–4, Middle Bathonian. M. 94.111. (x 1)

8a–c. *Zittelina* ? *beneckei* (PARONA). Hidas valley, Bed 20, Upper Bathonian. M. 94.112. (x 1)

9a–f. *Zittelina* ? *beneckei* (PARONA). Hidas valley, Bed 20, Upper Bathonian. M. 94.113. (a–c: x 1, d–f: x 2.5)